

REMARKS

Claims 19-21, 23, 24 and 35-45 are pending in this application. All claims stand rejected.

Independent claims 19, 35 and 42 have been amended to include the limitations of claims 21, 36 and 43 respectively wherein a gap exists between lands adjacent the helical channel and the valve stem, and the gap gradually increases in a direction from the flow inlet to the exit.

In the previous amendment, claim 44 was inadvertently amended instead of claim 45. Claims 44 and 45 have been amended to restore claim 44 to its original form and to properly amended claim 45.

Section 102 (b) rejections

Claims 19, 20, 35, and 40 were rejected under 35 U.S.C. 102 (b) as being unpatentable over US patent 4,303,382 to Gellert. Claims 20 and 40 are dependent on claims 19 and 35 respectively.

Gellert discloses three helical grooves (56) located on the internal surface of a nozzle tip portion (28), but lands adjacent the helical grooves on the inner surface (54) of the nozzle tip portion (28) abutt the outer surface (52) of a bushing (50) that receives a valve pin (36). There is no gap between the bushing and the lands. The helical channels (58) formed between the helical grooves (56) and the outer surface (52) of bushing (50) are, therefore, completely closed along the entire length of the nozzle tip portion (28).

Independent claims 19 and 35 have been amended to include the limitation of the gradually increasing gap. Since Gellert does not include this limitation, the amended claims now overcome the Examiner's rejection based on section 102 (b).

Section 103 (a) rejections

The remaining claims were rejected under 35 U.S.C. 103 (a) as being unpatentable over Gellert alone or Gellert in view of Swenson et al.

The amendments to the independent claims overcome the rejection based on Gellert alone.

As to the suggestion by the Examiner that it would have been obvious to modify the closed helical grooves of Gellert with the gap as taught by Swenson, such modification would change the principle of operation of the Gellert device. The helical grooves in Gellert function to increase the velocity of melt flowing through them and impart a

swirling motion to the melt as it enters the gate so that the melt flows outward from the gate with a curving motion to avoid unidirectional molecular orientation of the melt near the gate (see column 3 line 45 through column 4 line 5). It is important that the swirling motion continue to be generated as close as possible to the gate, and also that there be a minimum of melt to which a swirling motion is not imparted when the gate is first opened (column 3, lines 55-58). Modifying the Gellert device to create a gap, as taught in Swenson, would allow material flowing in the grooves to spill over the lands and through the gap in a longitudinal flow direction rather than a spiral direction. As the gap widens, more material would spill over and the spiral flow would further decrease until the flow would all be substantially longitudinal (see column 4 line 63 through column 5 line 5 of Swenson). Thus, with no spiral flow, the modified device would not function in the manner prescribed in Gellert.

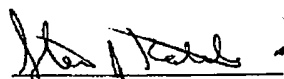
The device in Gellert also performs a different function than the present invention. The present invention and the device in Swenson both mix the material to homogenize it before it exits the nozzle. Gellert's three helical channels (58) do not provide for mixing of the material. Material flowing through the nozzle is separated into the three separate spiral-shaped melt flow channels (58) and it remains separate until converging again just before passing through the gate (see column three lines 44-47 and Fig. 6). There is no teaching or suggestion in Gellert of using the device to mix or homogenize the material before it exits the nozzle. Rather, the device only functions to impart a significant swirling motion to the melt as it enters the gate.

Due to the Gellert device performing a different function than the present invention, and Gellert's principle of operation being changed if modified with a gap as taught by Swenson, as suggested by the Examiner, the section 103 (b) rejection based on the combination of Gellert with Swenson is improper. Its withdrawal is respectfully requested.

The claims of the present invention now all recite the helical groove on an internal surface of the mixer and the gradually increasing gap, the combination of which is neither taught nor suggested in the prior art references cited, nor any proper combination thereof.

Respectfully submitted,
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